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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/690,884 | 10/22/2003 | Michael D. Gallant | 03-0986 | 6817 |

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| EXAMINER | |
|---|---|
| DIEP, NHON THANH | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2621 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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| 3 MONTHS | 03/26/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/690,884 | GALLANT ET AL. | |
| | Examiner | Art Unit | |
| | Nhon T. Diep | 2621 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *10 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/2005; 10/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Objections*

1. Claims 12, 16 and 18 are objected to because of the following informalities: With regard to claim 12, line 4, please change "half-pel" to –quarter-pel resolution--; and claim 16, line 3, please change "second" to –third—; and claim 18, line 4, please change "second" to –third—so they are in consistent with figure 1, el. 138-140, in which data of half-pel resolution (second motion vector) is fed to quarter-pel interpolation circuit. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 6-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Oruga (US 6,061,397).

Oruga discloses a motion detecting device comprising the same apparatus comprising:

a first circuit configured to (i) generate a first motion vector for a block at an integer-pel resolution and (ii) determine a single block size associated with said first motion vector (fig. 3, el. 153 and col. 1, ln. 61-67 and it is noted the applicant tries to broadly claim the invention, for that, the examiner will broadly interpret the claim; the claim does not recite a variable block size motion estimation process in which the

process generates a plurality of first motion vectors, each corresponding to one block size and to pick the best block size and its corresponding motion vector for the process of generating of second motion vectors at a sub=pel resolution; instead the claim calls for the generating of a first motion vector and then determining a single block size associated with the first motion vector, which is not logical since the motion vector can only generated when the block size is determined not the other ways); and

a second circuit configured to (i) generate a plurality of second motion vectors at a sub-pel resolution by searching proximate said first motion vector using said single block size (fig. 3, el. 157 and col. 2, ln. 16-22) and (ii) determine a motion vector for said block as a particular one of said second motion vectors best matching a plurality of reference samples (col. 3, ln. 53-55) as specified in claims 1, 11 and 20; said second circuit further comprises a memory configured to store said reference samples received from said first circuit (fig. 3, el. 154-155) as specified in claim 6; wherein said second circuit further comprises a shifter circuit configured to barrel-shift said reference samples read from said memory; wherein said second circuit further comprises a first interpolation circuit configured to generate additional reference samples at a half-pel resolution by interpolating said reference samples received from said shifter circuit wherein said shifter circuit is further configured to shift each of a plurality of columns of said reference samples received from said memory to align with seven outputs (inherently included in the process of figs. 4A and 5 and col. 5, ln. 23-25) as specified in claims 7- 8 and 10; wherein said second circuit further comprises a second interpolation circuit configured to generate more reference samples at a quarter-pel resolution by interpolating said

reference samples received from said first interpolation circuit (col. 5, ln. 23-25) as specified in claim 9; wherein step (B) comprises the sub-step of: generating a plurality of third motion vectors at a half-pel resolution by searching proximate said first motion vector (it is noted that the second motion vectors are generated by sub-pel = half-pel resolution and third motion vectors are generated by quarter-pel resolution so the third motion vectors should be claimed as being generated at a quarter-pel not half-pel resolution; col. 5, ln. 23-25 discloses a half-pixel or smaller pixel resolution and quarter-pixel = ½ of half pixel) as specified in claim 12; wherein searching proximate said first motion vector is performed with said single block size (col. 1, ln. 61 – col. 2, ln. 55) as specified in claim 13; further comprising the step of: interpolating said reference samples to said half-pel resolution prior to generating said third motion vectors (inherently included in the process of obtaining smaller than half pixel rate) as specified in claim 14; wherein step (B) further comprises the sub-step of: determining a half-pel motion vector as a particular one of said third motion vectors best matching said reference samples (just as the process of generating of second motion vectors starts with the first motion vector, the process of generating third motion vectors starts with the best second motion vector, col. 1, ln. 61 – col. 2, ln. 55 and col. 5, ln. 53-55) as specified in claim 15; wherein step (B) further comprises the sub-step of: generating said second motion vectors (third motion vectors are generated after finding the best second motion vector at a half-pel resolution) at a quarter-pel resolution of said sub-pel resolution by searching proximate said half-pel motion vector (just as the process of generating of second motion vectors starts with the first motion vector, the process of

generating third motion vectors starts with the best second motion vector, col. 1, ln. 61 – col. 2, ln. 55 and col. 5, ln. 53-55) as specified in claim 16; wherein searching proximate said half-pel motion vector is performed using said single block size (block size of the first motion vector) as specified in claim 17; further comprising the step of: interpolating said reference data to said quarter-pel resolution prior to generating said second (third) motion vectors () as specified in claim 18; and further comprising determining said single block size as part of generating said first motion vector (block size of the first motion vector) as specified in claim 19.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oruga.

As applied to claim 1 above, it is noted that Oruga does not particularly disclose wherein said second circuit comprises a plurality of processing elements each configured to generate a difference value by calculating an absolute difference between a first sample from said block and a second sample of said reference samples substantially simultaneously as specified in claim 2; and said second circuit further comprises an accumulation circuit configured to generate a sum value by calculating a sum of absolute differences from said difference values as specified in claim 3. The

examiner takes Official Notice that using a sum of absolute differences between pixels of the current block and the reference block in determining best match and then motion vector is a technique well known in the art. And therefore, it would have been obvious to one of ordinary skilled at the time the invention was made to use the well known technique in calculating the best match and determining the motion vector.

Regarding to claim 4: the second circuit further comprises a circuit configured to generate a motion vector by storing a lowest sum value from a plurality of searches at said sub-pel resolution (col. 2, ln. 53-55).

Regarding to claim 5: the plurality of processing elements form a three by three array (fig. 6).

***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Minami et al (US 6,380,986) discloses a motion vector search method and apparatus.

b. Liu et al (US 5,398,079) discloses half-pel interpolation for a motion compensated digital video system.

c. Hui et al (US 5,488,419) discloses video compression coding and decoding with automatic sub-pixel frame/field motion compensation.

d. Kang (US 6,304,603) discloses a block matching method using a moving target window.

e. Uetani (US 6,154,491) discloses a motion vector detecting method and apparatus.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhon T. Diep whose telephone number is 571-272-7328. The examiner can normally be reached on m-f.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ND
3/16/2007

NHON DIEP
PRIMARY EXAMINER